The Mars Science Laboratory Entry, Descent, and Landing System

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ABSTRACT

In 2012, the Mars Science Laboratory (MSL) mission will pioneer the next generation of robotic Entry, Descent, and Landing (EDL) systems, by delivering the largest and most capable rover to date to the surface of Mars. In order to deliver such a payload, the EDL system must employ several technological firsts. Such firsts include a lifting, guided entry which will drastically reduce the landing ellipse over all previous Martian missions. A custom built Pulse-Doppler radar with multiple antennae is used to located the surface and provide surface-relative velocity measurements. Finally, a unique soft landing technique called the Sky Crane is used to soft-land the rover on its wheels thereby eliminating the need for complicated and risky post-landing egress maneuvers. Implementing this unique and complex EDL system is fraught with many design challenges requiring innovative solutions – and uniquely innovative testing techniques. This paper discusses the MSL EDL architecture and discusses some of the challenges faced in delivering such an unprecedented rover payload to the surface of Mars